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The virtues of impact financing: Do financial institutions benefit from considering environmental impact in financing decisions

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Abstract

This paper studies whether impact financing is associated with financial benefits. By utilising the COVID-19 pandemic as an exogenous shock to China's stock market, we find that financial institutions that better integrate environmental impact in their financing process experienced positive stock return changes in response to the shock. The positive effect of impact financing on financial institutions' stock return reaction is approximately 1.43% and significant up to 5 trading days around the shock. We provide the very first empirical evidence to support the notion that financial firms can derive pecuniary utility from pursuing impact financing. Our findings advance the understanding of tensions between the objectives for corporate sustainability and add insights to the discussion about what the objective function of financial institutions should be in achieving sustainability. The study also contributes to the nascent but fast-growing literature on impact investing, in particular, the investments made through impact financing.

Keywords: Impact financing, corporate sustainability, environmental impact, stock performance, COVID-19, financial institutions

JEL code: G21, M14, Q56

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1. Introduction

Impact investing, investments made with the intention of generating both positive environmental and social impacts alongside financial returns (Freireich & Fulton, 2009; Höchstädter & Scheck, 2015) and have experienced rapid growth in size and attention over the past years (Brest & Born, 2013). Although most talks revolve around the private equity impact investing funds recently, the impact financing – impact investing in the credit market through debt financing (both private and public) is actually the largest asset class in general, and it counted for 61% of impact investments made in 2019 with USD 17 billion deployed (GIIN, 2020).

Debt financing by financial institutions generated the very earliest innovations in impact investing. Financial institutions structure financial products and services that are similar to conventional loans, mortgages, or funds but with the main goal to provide positive environmental impact (Edery, 2006; Weber, 2012) by increasingly inserting impact-focused provisions (e.g., requirements for considerations and reporting of borrower's impact performance) into credit agreements and integrating environmental risk considerations into financing decision making.

Different from impact investing through private equity landscape which directs capital to ventures and startups that are expected to generate positive environmental impacts, financial institutions pursue impact aware financing through funding existing companies' green projects and the transition of their business model with a goal to deliver measurable environmental benefits. For example, microfinance loans, green bonds, and emerged sustainability-linked bonds are common tools used by them to engage in impact financing. Financial institutions are more risk averse compared to private equity firms in impact investing, and they mostly finance companies' projects and business within a risk budget.

Despite the fact that impact financing by financial institutions has been taking the leading role in deploying capital to address climate challenges and attracting the most capital within the impact investing market (GIIN, 2020), there is lack of empirical research on the topic. Existing research focus on impact investing in equity landscape and overlook the impact financing in credit market. As a relatively underdeveloped field, we see emerging research aims to define and conceptualise impact investing and impact investors (Cojoianu et al., 2020; Höchstädter & Scheck, 2015; Hockerts et al., 2022), review the research development (Agrawal & Hockerts, 2019a), understand the transaction, motives and financial and social value incorporation (Andersen & Tekula, 2022; Meng et al., 2022; Moran & Ward-Christie, 2022; Roundy et al., 2017) and the expectations of wealthy private investors regarding the impact and financial return of impact investing practice (Paetzold et al., 2022). A recent study by Thompson (2023) examines whether the dual goals of impact investment are achievable by analysing the financial and impact risk of impact investment through debt finance in the form of bonds. However, there is a lack of quantitative research on impact investing, in particular, impact financing by financial institutions.

In this paper, we aim to address the gap in empirical analysis of impact financing. Specifically, we study the financial performance associated with environmental impact financing practices, and empirically investigate whether financial institutions that better incorporate environmental impact in their financing process have stock return benefits.

This research question is important from both academic and practical perspectives. First, it allows us to better understand the objective function of impact investors under the broad theme of corporate sustainability. By committing to the “triple bottom line” of sustainability (Elkington, 1998), the financial institution, as a major impact investor, employ well-developed ESG strategies with ethical considerations in their financing process. They finance business and projects that expected to generate environmental benefits and financial returns. However,

the tensions between these objectives (i.e., environmental and financial) are inherent to the practices of corporate sustainability (Haffar & Searcy, 2019). Hence, the investigation of financial performance associated with impact financing can advance the knowledge of the fundamental tensions, which may be expressed as either competition or complementarity that lead to either sustainability trade-offs or synergies (Epstein et al., 2015). More importantly, answering the question contributes to the discussion about what objective function financial institutions should consider in the sustainability transformation.

Second, impact investors in credit market play an essential role in addressing climate challenges by incorporating environmental impact considerations (e.g., reporting covenants and impact performance) into financing agreements. The rapid growth in asset under management for debt financing with a focus on impact generation provides enormous opportunities for financial institutions. Hence, it is vital to understand the performance of institutions that pursue impact financing since the lack of knowledge about their financial utility and relevant mechanisms could impose barriers to advancing industry growth and prevent potential investors from entering the market.

Can impact financing benefits financial institutions? The answer is not obvious since there are theoretical conjectures that support both concessionary returns and outperformance opportunities. The tensions between the different objectives for firms to pursue sustainability practices can lead to either trade-off or synergy (Haffar & Searcy, 2017). The trade-off theory asserts that firms face internal resource constraints. Thus, sustainable and non-sustainable projects compete for the same resources (Teng et al., 2014; Walley & Whitehead, 1994). In that sense, financial institutions that commit to the “triple bottom line” of sustainability could encounter sacrifice in financial returns to achieve positive sustainability impacts (Byggeth & Hochschorner, 2006; Haffar & Searcy, 2017).

However, the ‘profit maximizing’ conjecture based on the resource-based review of firms suggests that corporate sustainability practices that develop organisational capabilities can in turn benefit firms with sustained financial performances (Bansal, 2005; Li & Toppinen, 2011). Hence, financial institutions that pursue impact financing do not necessarily forego financial returns to achieve positive impacts, and they can “do well by doing good” instead. In addition, the notions of market friction and risk management further support that there are opportunities for impact investors to reap both financial performance and sustainability impacts.

To answer the research question of whether financial institutions benefit from pursuing impact financing, we utilise the Financing Environmental Impact ratings from MSCI ESG Stats to recognise financial institutions as being environmental impact aware, which intentionally incorporate environmental impact considerations into financing process and seek blended returns (i.e., environmental and financial). The Financing Environmental Impact ratings gauge the degree of environmental risks and concerns integration in financial institutions’ financing decision-making, which reflects positive indirect environmental impacts they could deliver.

We refer to impact financiers as financial institutions with leading performance in financing with environmental impact considerations. Because they are more impact-aware and more actively integrate environmental impacts into their due diligence and financing process. They intend to generate positive indirect impacts on the environment through financing companies’ green projects and activities. At the same time, they also expect financial returns on the services and products provided. Impact financiers attempt to achieve both positive environmental and financial returns by providing services such as green loans, green bonds and funds, and microfinance. In contrast, financial institutions with less or no inclusion of environmental impacts in their funding assessment process and have poor environmental due diligence are not considered impact financiers. Because their financing activities are less likely to deliver environmental benefits.

We examine the stock return performance of Chinese financial institutions that pursue impact financing during the outbreak of COVID-19 to draw new inferences on the profitability of impact financing. The pandemic outbreak in China, specifically the day of the Wuhan lockdown³ on January 23, 2020, provides a rare but useful opportunity to study the causal relationship between impact investing and financial performance for two reasons. First, the shock is purely exogenous. Because the spread of COVID-19 started in China in the first place and other countries were only affected later. Unlike the economic or financial crisis, the COVID-19 shock originated out of public health concerns. It was a sudden, unprecedented and large unparalleled shock to the stock market and exogenous to corporate sustainability practices and performance. Second, China's setting allows us to identify the exact date when the shock happened (i.e., January 23, 2020), which provides a cleaner effect with the use of daily stock returns.

Previous studies show the potential bidirectional causality between financial returns and corporate sustainability practices (Waddock & Graves, 1997) and possible third variables (e.g., regulatory effect) that influence both performance metrics. For instance, China's Green Credit Policy⁴ aims to promote green and sustainable banking and could affect the financial and environmental performance of financial institutions by exposing them to coercive pressure (Weber, 2017). Therefore, the COVID-19 crisis in China is meaningful as a laboratory to test whether impact financing adds value to financial institutions.

Utilising the COVID-19 outbreak in China as an exogenous shock, we use the fixed effects panel data analysis with a Difference-in-Differences (DiD) research design. We examined the stock performance difference between financial institutions with high and low

³ When the central government suddenly imposed the travel ban in Wuhan city and other cities in the Hubei Province to control for further spread of the coronavirus; the lockdown of 11 million people was the largest quarantine in public health history (Fang et al., 2020).

⁴ Green Credit Policy was issued by China's banking regulator in 2006 and aims to direct banking institutions to incorporate environmental risks into their financing practices.

Financing Environmental Impact scores in response to the COVID-19 shock. We document that financial institutions that proactively incorporate environmental impacts into their financing decision-making show higher stock returns compared to those that poorly manage their indirect environmental impacts. In other words, financial institutions that pursue impact financing show better stock returns than those that do not. This outperformance of return shows strong short-term effects that are significant for up to 5 trading days around the shock.

To the best of our knowledge, this is the very first empirical research to investigate whether impact financing practices financially benefits financial institutions. We advance the understanding of impact financing within impact investing by empirically examining the financial performance of impact aware financial institutions. The study contributes to the nascent literature on impact investing (Agrawal & Hockerts, 2019b, 2019a; Andersen & Tekula, 2022; Barber et al., 2021; Cojoianu et al., 2020; Höchstädter & Scheck, 2015; Meng et al., 2022; Moran & Ward-Christie, 2022; Roundy et al., 2017), in particular, the impact financing which is taking the lead in the impact investing boom. In contrast to the work by Barber et al. (2021) that investigate the expected financial returns of impact investing through private equity, we add new evidence on financial performance for impact investing made through credit financing, which dominates in the impact investing landscape.

In addition, we empirically test the conjecture of tensions between multiple objectives for corporate sustainability practices and provides evidence to the understanding of objective functions of financial institutions that pursue impact financing. The findings suggest that financial institutions could achieve environmental impacts without sacrificing financial returns and support the complementarity notion for corporate sustainability (Epstein et al., 2015). Given the pivotal role of financial institutions in achieving sustainability, the findings illustrate that they should consider both environmental impact and financial return for their objective

function. As the pursuit of impact financing is associated with better stock performance during crisis in addition to positive impacts generation.

Using an exogenous shock of the COVID-19 crisis in China, this study alleviates the potential endogeneity issues that affect companies' sustainability practices and performance relationship and draws inferences from China's context. By focusing on financial institutions intending to generate positive environmental impacts, this research also relates to the broad literature on socially responsible investment and, particularly, social financing (Weber, 2012).

2. Related Literature and Hypothesis Development

2.1. Impact Financing by Financial Institutions

Although the term impact investing is relatively new, the idea of utilising financing activities to solve social and environmental issues while achieving returns also applies to the practices of social finance (or social banking), which uses the concept of blended returns and declares positive social, environmental and sustainability impacts compatible with financial return (Weber, 2012). Over the past decades, financial institutions have been actively incorporating environmental considerations into their financing services, and funding business and projects that aim to mitigate environmental deterioration. For instance, they typically invest in green bonds that address climate change challenges and provide loans for environmentally friendly businesses and projects (e.g., renewable energy); or invest in green real estate or green ventures (Smalling, 2017).

The function of financial institutions in the transition to a sustainable economy is pivotal, as they are the core player in connecting the capital market with economic development by mobilising funds from the supply side to the demand side and providing products and services intentionally to address environmental challenges. Consequently, by inserting impact-oriented

provisions into funding agreements (e.g., impact measuring and reporting covenant) and credit risk management, financial institutions have significant indirect environmental impacts (Weber & Feltmate, 2018). Empirical studies suggest that they can show a significant indirect impact on the reduction of carbon dioxide emissions by financing renewable energy projects (Weber, 2011) and by adopting a green credit regime (Li & Toppinen, 2011a). Also the issues of green bonds are associated with a reduction in carbon intensity at the firm level (Fatica & Panzica, 2021).

2.2. Sustainability Integration in China's Financial Sector

The financial sector in China takes the responsibility of promoting and undertaking impact financing, especially, in solving environmental issues. With the national-wide sustainability transition, the Chinese authority has strongly promoted the development of its green finance system over the past decades. The financial sector is considered the key participant in mobilising the enormous capital required for pollution control and climate change mitigation. Financial institutions are charged with allocating capital resources effectively and taking environmental impacts into account when financing companies and projects.

Regulatory guidance has been a key driver for the rapid development of the green financial system in China. Since 2015, the government has introduced next-generation green finance policies that require financial institutions to take an even larger role in funding its green development agenda (Ho & E, 2018).⁵ The top-down green credit reform imposes tighter regulatory oversight of financial institutions and specifically direct them to undertake

⁵ Guiding Opinion on Establishing the Green Financial System, promulgated by six authorities, including the People's Bank of China (PBOC), China Ministry of Finance (MOF), National Development & Reform Commission (NDRC), China Ministry of Environmental Protection (MEP), China Banking Regulatory Commission (CBRC), China Securities Regulatory Commission (CSRC), and China Insurance Regulatory Commission (CIRC), August 31, 2016, effective August 31, 2016; Establishing the China's Green Financial System – The Green Financial Task Force (2015): <https://www.unepfi.org/news/establishing-chinas-green-financial-system-report-of-the-green-finance-task-force/>.

environmental due diligence and monitoring of their clients' environmental risks and impacts (Ho & E, 2018). The regulatory pressure enforces Chinese financial institutions to assess their indirect environmental impacts in financing and encourage investments in firms and projects that can deliver positive environmental influences. These initiatives also integrate the financial sector into environmental sustainability financing and show positive impacts on sustainable development (Weber, 2017).

Therefore, given the strong regulatory enforcement, financial institutions in China have a strong intention to integrate environmental aspects into the financing process to address environmental issues and generate indirect environmental benefits alongside financial returns. Although they have a strong regulatory-driven intention to conduct impact financing, the degree of environmental impacts integration can vary across firms.

2.3. Impact Financing and Financial Performance: Tensions in the Practice of Corporate Sustainability

The literature recognises the tensions between the multiple objectives of corporate sustainability, which can be expressed as either competition or complementarity (Epstein et al., 2015) and lead to either trade-offs or synergies that are commonly encountered in the pursuit of corporate sustainability (Haffar & Searcy, 2017). As the same bifurcation applies to impact investing practices that tend to take either 'impact-led', in which investors concede financial returns to generate social and/or environmental impact; or 'finance-first', in which investors seek to deliver social impacts while maintaining market-related financial returns (Freireich & Fulton, 2009).

In undertaking corporate sustainability, companies face the trade-off between improving either their financial or nonfinancial performance (Haffar & Searcy, 2017). As companies face internal resource constraints, taking sustainable initiatives can face competing

claims from non-sustainable projects for the same resources (Teng et al., 2014; Walley & Whitehead, 1994). The trade-off encountered in the practices of corporate sustainability is generally described as a sacrifice made in one area (e.g., one objective) to achieve benefits in another (Byggeth & Hochschorner, 2006; Haffar & Searcy, 2017). Following this line of reasoning, companies that pursue sustainability activities struggle to reconcile competing sustainability and profitability objectives (Li & Toppinen, 2011b).

Impact financiers incorporate environmental impacts into account when allocating capital resources and funding projects, and they finance with an emphasis on the blended value of both impact and returns. Following the trade-off rationale of corporate sustainability, impact financiers might expect concessionary or below-average returns, as they face the constraint of generating a positive environmental impact on the investing opportunities set, which might hurt their financial performance.

Some research supports this rationale. By investigating whether impact investors are willing to forego returns for nonpecuniary utilities, Barber et al. (2021) find that impact venture capital funds earn 4.7 percentage points lower internal rates of returns (IRRs) than traditional venture capital funds, and investors accept 2.5 to 3.7 percentage points lower IRRs ex-ante for impact funds by modelling the willing-to-pay for impact investors. Their findings support the assumption that by prioritising the positive impact creation, impact investors sacrifice financial returns. Similar results were reported in initial qualitative industry research on impact investments. For instance, Brown and Norman (2011) show that the vast majority of social investment and finance intermediaries in England, who attract capital from social investors and use it to make direct investments in front-line social ventures, were operating at a loss with their operating income failing to cover the operating costs. This “sustainability gap” is even larger after taking the portfolio losses into account.

Therefore, according to the trade-off logic in the practices of corporate sustainability, financial institutions that engage in generating environmental value in addition to profitability might expect to concede financial returns for impacts. This leads to the hypothesis that environmental impact financing lowers the financial performance of financial institutions.

Hypothesis 1 (H1): Environmental impact financing leads to lower financial returns for financial institutions.

A different line of reasoning that follows the resource-based review of firms suggests that corporate sustainability practices that develop the company's organisational capabilities, which in turn helps to generate sustained and sustainable performances. This is known as the 'profit maximizing' conjecture and holds that companies can 'do well by doing good' (Bansal, 2005; Li & Toppinen, 2011c). Following the resource-based view of the company, the engagements in corporate sustainability practices, such as the implementation of pollution control, could optimise the firm's resource usage, lower operation costs and enhance its reputation and social capital. These initiatives ultimately help firms to achieve sustained competitive advantages (Ambec & Lanoie, 2008; Barney, 1991; Hart, 1995; Porter & Linde, 1995). Porter and Kramer (2011) suggest that the generation of social impact and economic performance does not necessarily follow the trade-off notion. Instead, it is about expanding the total pool of economic and social values, and investing with impact creation can be associated with profitability via cost reduction. In that sense, although impact investing adds impacts to the total value assessment, it does not necessarily imply that investors must forego financial returns to achieve positive societal values.

Additionally, based on the notion of market friction, it is possible for socially motivated impact investors to reap both environmental benefits and financial returns. Impact investing typically does not occur in large public markets but in domains with market frictions that

impose barriers on socially neutral investors. For instance, investors at large might not be aware of opportunities embedded in segments that are targeted by impact investors due to a lack of reliable information about the risks and returns, while impact investment fund managers or other intermediaries have particular expertise or intelligence in environmental and social niche markets. Thus, non-concessionary impact investors are likely to invest in conditions of imperfect information and achieve both social impact and financial performance (Brest & Born, 2013). It is possible that the market fails to fully price opportunities in impact investing markets (e.g., sustainable agriculture and clean energy), and the pursuit of impact financing enables investors to achieve non-concessionary returns (Smalling, 2017).

Moreover, impact investors generally incorporate ESG assessments within their impact due diligence, which helps to mitigate their investment risks. This is particularly relevant for financial institutions that engage in impact financing. As environmental and social risks could be a source of direct liability for lenders if they bear legal responsibility to clean up contamination caused by an insolvent borrower (P. Thompson, 1998). More commonly, the environmental risk associated with borrowers' environmental practices affects the market risk, credit risk, underwriting risk, and business risk that financial institutions bear (G20 Financial Stability Board, 2017). For instance, a corporate borrower's efficiency in managing energy, water, and other natural resources and the extent to which its operations impair those resources may translate into higher costs or reduced revenues; legal liability or reputational harm can also impair its future profitability (Elsakit & Worthington, 2012).

Impact financing with environmental impact integration aims to manage risk by investing in sustainable management in enterprises that face less regulatory risk due to climate regulation changes and fewer reputational risks (Smalling, 2017). Industry research shows that investors proactively incorporate environmental and social impact considerations (i.e., ESG prudence) into their portfolios to help reduce volatility and identify risks beyond the balance

sheet. Consequently, leading to enhanced risk management and shareholder value since nonfinancial factors such as reputation, environmental performance, and social commitments are increasingly essential for firm valuations, and better management of these ESG factors benefits shareholder values (Snider, 2018). For example, Cambridge Associates and GIIN (2015) conduct the very first comprehensive research on the financial performance of market-rate private equity and venture capital impact investing funds. The study documents that impact investing funds that launched between 1998 and 2004 outperformed conventional private investment funds, and the outperformance was pronounced in the emerging market during the period. However, given the dynamic and long nature of the performance of private investment funds, the evolved performance has been recorded.

Hence, applying the ‘profit maximisation’ reasoning of corporate sustainability to impact investing, the discussions lead to the hypothesis that environmental impact financing should be associated with outperformance.

Hypothesis 2 (H2): Environmental impact financing leads to superior financial returns for financial institutions.

3. Research Methodology

3.1. Sample and Data

The sample includes 56 Chinese financial institutions in the MSCI China index series, and have Environmental Financing Impact ratings from the MSCI ESG Stats (formerly known as KLD). The sample covers major financial institutions in China that being main participants in developing green financing system. To test the return performance of financial companies with different impact financing ratings to the shock of the Wuhan lockdown, we collect sample firms’ daily stock market trading data and primary company attributes from Bloomberg. To better

capture the effect of the coronavirus outbreak on the equity market, we use a 2-year sample period that ranges from January 2019 to December 2020 and has balanced periods around the shock.

3.2. Variables and Summary Statistics

3.2.1. Dependent Variable

We use the daily stock excess return $Ret_{i,t}$ as the dependent variable to proxy the financial performance of institutional investors. According to the meta-analysis by (Dixon-Fowler et al., 2013), they find that environmental performance seems to have the strongest effect on the market measures of financial performance (i.e., stock prices). Orlitzky et al. (2003) point out that the stock returns as a market-based measure reflect shareholders acting as the primary stakeholder whose satisfaction with sustainable performance moves the stock prices. The market-based performance measure allows one to examine the market expectation towards integrating environmental impacts in investing.

For company i on day t , we compute the logged stock return by taking the difference of logged prices (with dividends adjusted) and then obtain the excess return ($Ret_{i,t}$) by subtracting the logged daily risk-free asset return from the logged daily stock return (as shown in Equation 1). We use the 3-month Chinese Treasury bill rate to proxy the risk-free rate, and the 3-month interest rate is transformed into the daily risk-free returns to match our observation frequency.

Equation 1 Daily Excess Return

$$Ret_{i,t} = \text{Log}(P_{i,t}/P_{i,t-1}) * 100 - \text{Log}(Rf_{t1d})$$

3.2.2. Financing Environmental Impact Management

The primary independent variable used to test the hypothesis is financial institutions' Financing Environmental Impact Management Score. This rating is the proactive management component of the Financing Environmental Impact key issue.⁶ MSCI ESG Stats identifies the Financing Environmental Impact as a key issue that has a material impact on environmental and social externalities. In contrast to the other key environmental issues (e.g., Carbon Emissions, Energy Efficiency, and Product Carbon Footprint, etc.), the Financing Environmental Impact is particularly for the financial institutions whose fundamental business is financing and investing activities, which can generate vast indirect environmental impacts. As a key issue in the MSCI ESG rating system, the Financing Environmental Impact consists of the Risk Management and Risk Exposure components, which present the relevant environmental risk exposures and the strength of management practices to mitigate the risks.

The Financing Environmental Impact Management Score (hereafter referred to *Impact Management Score*) measures the strength of the management system for financial firms, and it indicates how well a financial institution manages environmental risk by taking their financing decisions, due diligence process, and controversy investments into account. *Impact Management Score* typically assesses the organisational capacity and firm management's level of commitment to address environmental risks, including the level of the firm's responsibility for the risks, the strength of policy commitments, and the scope of commitment to standards. It also evaluates the strength and scope of initiatives, programs, and targets in place to improve the performance of environmental risk management and the quantitative performance of risk mitigation.

⁶ The MSCI ESG rating system covers a wide range of key issues that have material impacts on sustainability. Each key issue has an overall score that is computed based on two components -- the Risk Management and Risk Exposure scores.

Specifically, financial firms that proactively address the environmental risks embedded in their financing decisions score higher on this key issue. In contrast, companies that have not articulated a strategy for managing indirect environmental risks score lower. Financial institutions with high scores show stronger intention and better integration of environmental impact in their financing and investing activities. They are more likely to generate positive indirect impacts (or reduce negative indirect impacts) on the natural environment, while firms that score low indicate weaker motivation and less consideration of environmental risks and impacts.

Therefore, the *Impact Management Score* can well represent the integration degree of environmental impacts (e.g., risks) in the financing business and the likelihood of generating indirect positive impacts on the environment, and we use the latest available data prior to the pandemic outbreak (as of December 2019) to distinguish impact financier and non-impact financier.

The *Impact Management Score* ranges from 0 to 10, and we code it into a dummy variable $IMP_MGMT_Top_i$ and assign firms in the top quartile of scores' distribution as one and firms in the remaining quartiles as zero. The $IMP_MGMT_Top_i$ dummy then presents financial institutions that proactively implement impact financing. In addition, we create another dummy variable $IMP_MGMT_Top_Bottom_i$, which equals one for firms with ratings located in the top quartile of the score distribution, a negative one for firms that have ratings in the bottom quartile and zero for the rest quartiles. This indicator aims to compare financial institutions with top environmental financing impact scoring with the low-scoring institutions.

3.2.3. Event Windows

To test the causal relationship between impact financing and stock return performance in a more robust statistical setting, we utilise the unprecedented Wuhan lockdown on January 23,

2020, imposed by the central government in China as an exogenous shock. To better capture the market reactions to the timing of the shock, we used a contrast dummy coding method and created different time dummies around the event day with different lengths.

Specifically, the two-sided dummy variable $Event_Nd_t$ equals one for observations from N-day periods on and after January 23, and it equals negative one for N-day periods before the event and equals zero for the rest of the observations. For instance, $Event_1d_t$ codes the 1-day period on and after the event (i.e., January 23, 2020) as one, the 1-day period before the event as minus one (i.e., January 22, 2020), and the remaining observations as zero. In a similar manner, we created time dummies with 1-day, 3-day, 5-day, 10-day, and 15-day lengths. The contrast coding system allows one to compare the effects of post-event with the effect of pre-event with the same window length. It captures how the return changes from the days before the pandemic outbreak to after.

3.2.4. Controls

Following the prior literature, we include control variables that have the potential to explain firm-level stock returns in the analysis. The controls include the Ln (Asset), MTB, ROA, Cash Ratio, Leverage, Net Income Growth, Turnover, Investment, and Fama-French factor loadings (Albuquerque et al., 2020; Garcia-Castro et al., 2010; Shan & Tang, 2022). The logarithm of total assets is used to measure the size of financial companies, which is generally considered a determinant of profitability. The study of Chinese banks by Garcia-Herrero et al. (2009) suggests that banks with larger sizes can reduce the cost level due to economies of scale, and they are usually associated with better diversification, which yields lower risks and good returns. ROA is widely used to measure operational efficiency, which explains the returns made from the assets financed by financial services companies (Tan & Floros, 2012). Leverage, which is considered a determinant to explain the performance and liquidity of financial institutions, is also included (Sufian, 2009). Moreover, we add stock turnover as a trading

liquidity factor to explain the returns of stocks. Other firm-level financial characteristics are general factors that have explanatory power regarding stock returns (Albuquerque et al., 2020; Shan & Tang, 2022); we also control for the firm's factor loadings based on the Fama-French three-factor and momentum factor (Lins et al., 2017). We estimate the factor loadings over the 60 months prior to the outbreak of COVID-19, and the loadings are re-estimated each month. We obtained factor returns from the CSMAR database.⁷ The firm-level controls are on an annual basis and lagged for one year, and the factor loadings are updated monthly. Table 1 summarises the definitions and construction details of the main variables.

3.2.5. Summary Statistics

Table 2 presents the descriptive statistics for the main variables. The mean daily excess return for firms during the sample period is approximately 0.066%, with a relatively high standard deviation of 2.2. Firms in the sample are generally large companies that have an average size of logged assets of about RMB 13.18 million (or USD 2.07 million). They have a mean MTB of 1.09 and an average ROA of 1.19%. The mean cash ratio for sample firms is 14.74% (0.1474), which marches with the average cash reserves held by major banks in China.⁸ Consistent with the industry reports on the leverage of the financial industry (Zhang et al., 2019), sample firms have a mean leverage of 0.69. They have a net income growing at a mean rate of 0.43 annually and relatively low investment in capital expenditures of 0.35%. Regarding the Financing Environmental Impact Management ratings, firms in the sample have Impact Management scores ranging from 0 to 7.1 with a mean of 2.2, a median of 1.3, and a standard deviation of 1.93. Table 3 shows the correlation matrix of the major variables.

⁷ CSMAR is one of the leading corporate datasets that covers Chinese listed firms; it is similar to the CRSP/COMPUSTAT databases in the US.

⁸ Cash reserve ratio in big banks in China from September 2019 to September 2021: <https://www.statista.com/statistics/921462/china-big-banks-cash-reserve-ratio/>.

3.3. Empirical Model

To examine the causal linkage between impact financing and stock return performance, we use fixed effects panel data analysis with a DiD design to investigate the post- and pre-differences of stock returns for impact financiers compared to non-impact financiers. Equation 2 shows the model specification. We organise 56 sample firms with daily time series data over a 2-year period as a panel format and regress the stock excess returns on the $IMP_MGMT_Top_i$ dummy, a time dummy that takes different window lengths $Event_Nd_t$, their interaction term, and other control variables. We code a $IMP_MGMT_Top_i$ dummy to denote the financial companies with financing environmental impact scores in the leading range (i.e., in the top quartile), which indicate the impact financier. The two-tailed dummy $Event_Nd_t$ around the event day (i.e., January 23, 2020) captures the post- and pre-event differences up to the N-day length. The $IMP_MGMT_Top_i$ indicator then interacts with the event dummies $Event_Nd_t$ of different window lengths.

We focus on the estimated coefficient of the interaction term β_3 , which captures the return difference between impact and non-impact financier around the shock (i.e., the post- and pre-event difference). The model includes a vector of control variables $Control_{i,t-1}^k$ that have explanatory power on stock returns and GICS sub-industry fixed effects $Sub - industry FE_i$ to control for potential industry-specific characteristics.⁹ We use fixed effects on the industry level rather than on the firm level since the firm-level fixed effects could be collinear with company-specific Impact Management scores. The standard errors are two-way clustered by firm and week.

⁹ The MSCI ESG score assessment system uses the same GICS level 4 (sub-industry) groups to evaluate firms' ESG key issue scores relative to their peers in the same industry

Equation 2 Model Specification: Top Impact Management Score

$$Ret_{it} = \beta_0 + \beta_1 IMP_MGMT_Top_i + \beta_2 Event_Nd_t + \beta_3 IMP_MGMT_Top_Event_Nd + \sum_k \beta_4 Control_{i,t-1}^k + \beta_5 Sub - industry\ FE_i + \epsilon_{it}$$

In addition, we further compare the return difference between the *top* and *bottom* Environmental Financing Impact scoring firms following the model in Equation 3 as a robustness test. Specifically, we code a contrast dummy of $IMP_MGMT_Top_Bottom_i$, which equals one if a firm's Environmental Financing Impact score is located in the top quartile, equals negative one if a firm's score is located in the bottom quartile and zero otherwise. This dummy captures the divergence between the top- and bottom-rated impact financing behaviour. We then interact the $IMP_MGMT_Top_Bottom_i$ dummy with the two-tailed $Event_Nd_t$ dummy to create the $IMP_MGMT_Top_Bottom_Event_Nd$ interaction terms. The model in Equation 3 also controls for the same set of variables as used in Equation 2. Additionally, we include the sub-industry fixed effects and cluster standard errors by firm and week.

Equation 3 Model Specification: Top and Bottom Impact Management Score Comparison

$$Ret_{it} = \beta_0 + \beta_1 IMP_MGMT_Top_Bottom_i + \beta_2 Event_Nd_t + \beta_3 IMP_MGMT_Top_Bottom_Event_Nd + \sum_k \beta_4 Control_{i,t-1}^k + \beta_5 Sub - industry\ FE_i + \epsilon_{it}$$

4. Empirical Results

4.1. Stock Returns and Impact Financing

4.1.1. Top Financing Environmental Impact Scoring

We first estimate DiD regressions of stock excess returns as a function of financing environmental impact performance following the model specification shown in Equation 2, and

the coefficient of the estimated interaction term in the model shows how the impact financier's stock return changes from before the outbreak to after, relative to financial firms with a low level of impact investments. We run daily stock excess returns on a high environmental financing impact indicator, the two-tailed dummy around the event day with 1-day, 3-day, 5-day, 10-day, and 15-day intervals and interactions.

Table 4 presents the regression results. Each column shows the results of regression with the use of different lengths of time dummies. Column (1) in the table indicates that financial institutions with high environmental financing impact have a positive stock return change of 1.432% from the day before the Wuhan lockdown to the day when it was implemented. This positive return change is highly significant (at the 1% level). Column (2) presents the regression estimates using a 3-day window of contrast dummy. The coefficient of the interaction term is positive (1.01) and highly significant, which suggests that the change of stock return for impact financier (i.e., firms with Impact Management scores located in the top quartile) is approximately 1.01% on average from the three days before the shock to three days after, compared with companies financing with less environmental impact considerations. This positive change in stock returns is still significant in the 5-day window around the shock (Column (3)), but the size of the effect and significance level dropped, with a 0.477% return change that was significant at the 5% significance level. With the increase in window length, the effect of impact financing on stock returns decays, and no significant effects are observed in the 10-day and 15-day windows.

Since the positive stock return effect for impact financing is strong for two-sided event windows up to 5 days, we further estimate regressions on more granular intervals to facilitate the interpretation of the results. We re-estimate the model using event dummies from 1-day through 10-day and plot the estimated coefficients of interactions over ten intervals. Figure 1 shows the change in the estimated coefficients over time. Financial institutions with high

environmental financing impact ratings have a positive return change within short-term periods after the shock of the Wuhan lockdown compared with control firms. The positive return difference is highly significant from 1-day to 5-day two-tailed intervals, and the effect decays afterward.

4.1.2. Top and Bottom Financing Environmental Impact Scoring Comparison

In addition to assessing the return effect of firms with top financing environmental impact scoring around the crisis outbreak, we further compare the stock return divergence between top-scoring and bottom-scoring firms (i.e., Equation 3) to check the robustness of findings. We run the same regression analysis using the contrast-coded dummy of *IMP_MGMT_Top_Bottom_i*, which compares the top financial environmental impact rating firms with the bottom ones. In a similar manner, we first test the two-tailed event dummies of 1-day, 3-day, 5-day, 10-day, and 15-day windows.

Table 5 summarises the estimation results. Column (1) presents a positive coefficient of the interaction term (0.688) that is significant at 1%, which demonstrates a positive return change associated with top-scoring firms from one day before the lockdown to the day when it was implemented compared with bottom-scoring firms. The positive return effect is significant for the 3-day and 5-day windows, with a size of 0.55% and 0.257%, respectively. However, no significant return change is observed for the 10-day and 15-day windows. Compared to the baseline results in Table 4, the size of the coefficients is smaller when evaluating the return difference between the top- and bottom-scoring companies.

To more closely examine the results regarding the return divergence between high and low environmental impact financing firms over the crisis, we further run regressions of excess returns using short intervals from 1-day to 10-day and plot the estimates of interactions in

Figure 2. Over time, the return difference between the high- and low- environmental financing rating companies decreases in size, and no significant effect is observed when the window is longer than 5 days. Overall, the return difference between top- and bottom-rating financial firms shows a smaller change from before the pandemic to after compared with the difference between top-rated firms and those in lower quartiles.

4.2. One-year Subperiod Robustness Checks

To further validate the robustness of the regression results, we re-estimate the model shown in Equation 2 using a one-year subsample period that ranges from January 2020 to December 2020. Table 6 presents the regression results of daily excess returns on the top-rated firms of impact financing for the subperiod. The estimated coefficients of interaction terms remain highly significant for up to a 5-day length, and the sizes of return impacts are nearly the same compared to the results of regressions for the entire sample period. We further check the intervals from 1-day through 10-day and plot the interaction coefficients in Figure 3.

We also check the robustness of the findings for the top- and bottom-rated impact financing firms comparison and summarise the regression results for the subperiod in Table 7. With a shorter sample period, we find that the return differences between the top- and bottom-rated impact financing companies remain highly significant for the 1-day, 3-day, and 5-day event windows, and the sizes of the coefficients remain similar to the findings for the full sample. We further show the return reactions on more granular intervals in Figure 4.

Overall, the findings support the hypothesis that impact financing is associated with positive stock return performance. Financial institutions with highly-rated environmental financing impacts are associated with a positive return change from before the pandemic to after compared to low-impact companies. The positive return effect of impact financing shows relatively short-term consequences, and the return difference is significant for up to five days

and decays thereafter. In addition, when comparing the top and bottom environmental impact scoring financial institutions, the return distinction is still significant (from 1-day to 5-day around the shock), but with the size of the impact nearly halved. The Chinese stock market experienced a wide price decline over the outbreak of COVID-19, and financial institutions that well managed environmental risks and impacts prior to the crisis better weather the negative shock. To further check the robustness of the results, we check the relation between impact financing and stock returns using a shorter one-year sample period, and significant findings are observed.

5. Conclusion

By straddling the importance of ethical purposes and performance outcomes, impact investing has experienced rapid growth in size and attention over the past decades. The increasing number of financial institutions actively incorporate ethical, social, and environmental considerations into the financing process and look for a blended return of both positive societal value and financial performance. Despite the popularity of impact financing in practice (i.e., as the largest asset class in impact investing), the understanding of their value generation is limited.

In this paper, we provide the very first empirical investigation to examine whether impact financing financially benefits financial institutions. By utilising the exogenous shock of the COVID-19 and the Financing Environmental Impact Management ratings, we estimate the return difference between financial institutions with high- and low-impact investing scores around the shock. Our findings show that financial firms with good integration of environmental impacts in their financing decision-making experienced positive stock return changes in response to the shock, and this positive effect on stock returns is highly significant for up to 5 trading days around the pandemic shock.

The findings contribute to the nascent but fast-growing literature on impact investing, in particular, impact financing within the landscape. It empirically supports the notion that financial investors can reap both financial performance and positive environmental impacts. More importantly, our findings suggest that the financial institution, as a key player in sustainability transformation, should incorporate environmental impact into their objective function, as it adds both financial and societal values.

6. References

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Table 1 Definition and Construction of Main Variables

Variable	Definition	Source
Excess Return ($Ret_{i,t}$)	Daily stock excess return in percentage. Daily log returns a stock over the daily risk-free rate. The 3-month China government bill rate is used as the risk-free rate, it transformed into a daily risk-free rate $Ret_{f,t}$ follows $\ln((1 + R_{f,t,3M}) * 91 / 365.25)$.	Bloomberg
Impact Management Score Top ($IMP_MGMT_Top_i$)	A binary dummy indicator taking one if a financial company has Financing Environmental Impact Management score locates in the top quartile of distribution, and zero otherwise.	MSCI ESG Stats & Self-constructed
Impact Management Score Top – Bottom ($IMP_MGMT_Top_Bottom_i$)	A contrast-coded dummy indicator takes one if a firm's Financing Environmental Impact Management score locates in the top quartile, negative one if the score locates in the bottom quartile, and zero for observations in other quartiles.	MSCI ESG Stats & Self-constructed
$Event_Nd_t$	A contrast-coded time dummy equals one for observations from N-day periods on and after January 23, and it equals a negative one for N-day periods before the event and equals zero for the rest of the observations.	Self-constructed
Ln (Asset)	Natural logarithm of the total of all short and long-term assets as reported on the balance sheet at end of the year.	Bloomberg
MTB	Market value of common equity at the end of the year divided by its book value at the end of the year.	Bloomberg
ROA	Return on asset: $\left(\frac{\text{Trailing 12M net income}}{\text{Average total asset}} \right) * 100$	Bloomberg
Cash Ratio	Ratio to measure the percentage of cash and near cash over total assets: $\frac{\text{Cash and near cash}}{\text{Total assets}}$	Bloomberg
Leverage	Measure of financial leverage: $\frac{\text{Total debt}}{\text{Total capital}}$	Bloomberg
Net Income Growth	Revenue growth year over year: $\left(\frac{\text{Revenue from current period} - \text{Revenue from prior year}}{\text{Revenue from prior year}} \right) * 100$	Bloomberg

Turnover	Measure of stock liquidity: <i>Traded shares volume</i> <i>Total shares outstanding</i>	Bloomberg
Investment	Capital expenditures at the end of the year divided by total assets at the end of the year.	Bloomberg
Market Loading	The estimated factor loading use the Fama-French Market Factor returns over the prior 60-month period. For each month, the loadings are re-estimated based on the previous 60 month's data.	CSMAR & Self-constructed
SMB Loading	The estimated factor loading use the Fama-French SMB Factor returns over the prior 60-month period. For each month, the loadings are re-estimated based on the previous 60 month's data.	CSMAR & Self-constructed
HML Loading	The estimated factor loading use the Fama-French HML Factor returns over the prior 60-month period. For each month, the loadings are re-estimated based on the previous 60 month's data.	CSMAR & Self-constructed
MOM Loading	The estimated factor loading use the Carhart Momentum Factor returns over the prior 60-month period. For each month, the loadings are re-estimated based on the previous 60 month's data.	CSMAR & Self-constructed

This table reports the definition, construction method and source of main variables used in analyses.

Table 2 Descriptive Statistics of Main Variables

	N	Mean	SD	Min	Median	Max
Excess Return	25,443	0.0657	2.1989	-10.6079	-0.0076	11.4554
Ln (Asset)	25,443	13.1848	1.9866	10.1698	12.8701	17.2203
Market-to-Book	25,443	1.0853	0.4731	0.4333	1.0400	3.0481
ROA	25,443	1.1955	0.7811	0.0502	1.0413	5.4048
Cash Ratio	25,443	0.1474	0.0695	0.0322	0.1542	0.3020
Leverage	25,443	0.6922	0.1044	0.3699	0.6984	0.8544
Net Income Growth	25,443	0.4321	1.5831	-0.9657	0.0787	12.0223
Turnover	25,443	1.0668	1.6178	0.0150	0.5480	31.0470
Investment	25,443	0.0035	0.0128	0.0003	0.0016	0.1134
Market Loading	25,443	1.2847	0.4202	0.4081	1.3523	6.4538
SMB Loading	25,443	0.3697	0.7526	-0.9336	0.1893	7.0292
HML Loading	25,443	0.7333	1.4262	-1.4245	0.6483	33.2423
MOM Loading	25,443	-0.1781	0.6108	-1.5331	-0.1872	12.2871
IMP MGMT	25,443	2.2020	1.9309	0.0000	1.3000	7.1000

This table presents the summary statistics of the main variables at the firm-day level. The sample includes 56 Chinese financial services companies from January 2019 to December 2020.

Table 3 Correlation Matrix of Main Variables

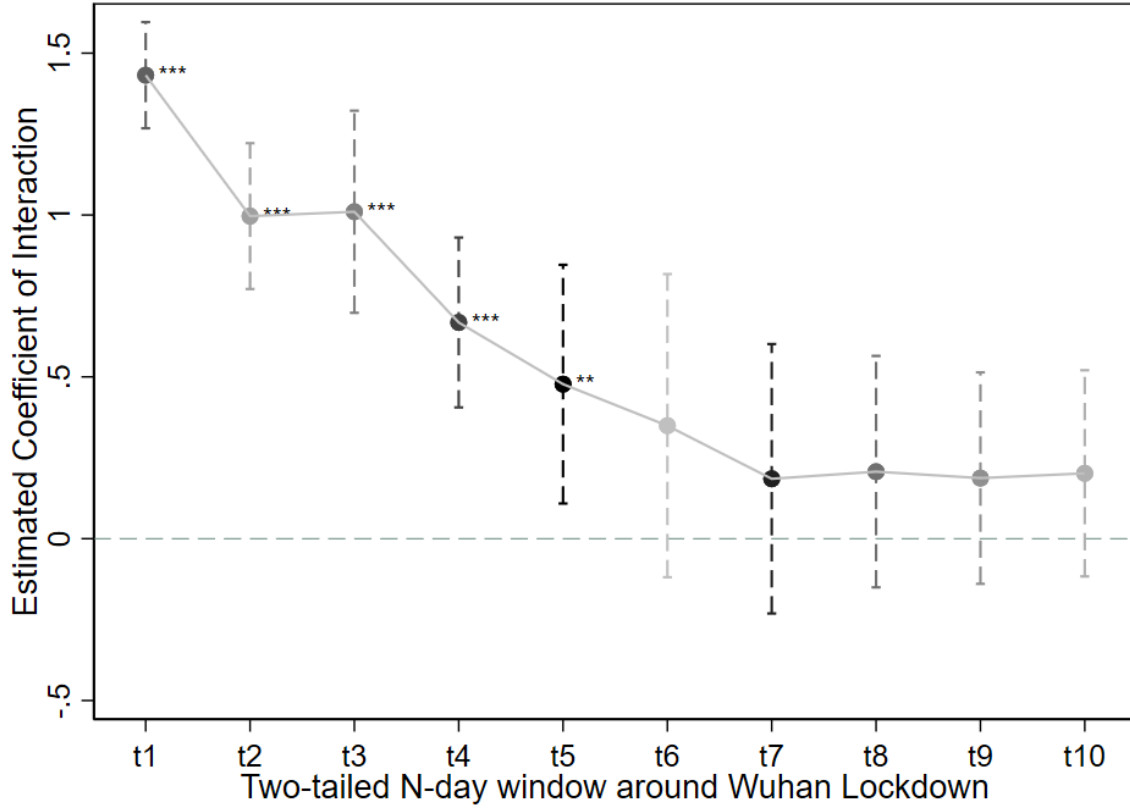
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Excess Return	1.000												
(2) Ln(Asset)	-0.014	1.000											
(3) Market-to-Book	0.007	-0.684	1.000										
(4) ROA	-0.006	-0.311	0.381	1.000									
(5) Cash Ratio	0.010	-0.630	0.538	0.154	1.000								
(6) Leverage	-0.006	0.454	-0.424	-0.417	-0.536	1.000							
(7) Net Income Growth	-0.004	-0.175	0.278	0.104	0.260	-0.024	1.000						
(8) Turnover	0.089	-0.378	0.370	0.122	0.250	-0.218	0.097	1.000					
(9) Investment	-0.006	-0.228	0.123	0.701	-0.144	-0.193	-0.015	0.014	1.000				
(10) Market Loading	0.010	-0.608	0.426	0.069	0.534	-0.328	0.087	0.334	-0.058	1.000			
(11) SMB Loading	0.006	-0.382	0.351	0.105	0.177	-0.228	0.019	0.402	-0.025	0.515	1.000		
(12) HML Loading	-0.010	0.138	-0.181	-0.097	-0.139	0.039	-0.078	0.052	-0.059	0.459	0.503	1.000	
(13) MOM Loading	-0.003	0.136	-0.011	0.039	-0.240	0.112	0.003	0.107	0.009	0.238	0.593	0.768	1.000

Table 4 DiD Regressions of Daily Returns on Top Environmental Financing Impact

	(1) Excess Return	(2) Excess Return	(3) Excess Return	(4) Excess Return	(5) Excess Return
IMP_MGMT_Top	0.00585 (0.13)	0.00441 (0.10)	0.00459 (0.10)	0.00445 (0.10)	0.00650 (0.14)
Event_1d	-2.556*** (-49.42)				
IMP_MGMT_Top_Event_1d	1.432*** (17.51)				
Event_3d		-1.969** (-2.63)			
IMP_MGMT_Top_Event_3d		1.010*** (6.49)			
Event_5d			-0.930*** (-4.81)		
IMP_MGMT_Top_Event_5d			0.477** (2.60)		
Event_10d				-0.421* (-1.70)	
IMP_MGMT_Top_Event_10d				0.202 (1.27)	
Event_15d					0.142 (0.41)
IMP_MGMT_Top_Event_15d					-0.187 (-0.78)
Ln (Asset)	0.000587 (0.03)	0.00158 (0.08)	0.00155 (0.08)	0.00154 (0.08)	0.0000713 (0.00)
Market-to-Book	-0.134* (-1.80)	-0.138* (-1.79)	-0.138* (-1.82)	-0.138* (-1.83)	-0.132* (-1.76)
ROA	-0.0283 (-0.65)	-0.0294 (-0.65)	-0.0293 (-0.65)	-0.0294 (-0.66)	-0.0278 (-0.61)
Cash Ratio	0.183 (1.04)	0.197 (1.11)	0.196 (1.10)	0.196 (1.11)	0.175 (0.97)
Leverage	0.0328 (0.16)	0.0333 (0.16)	0.0337 (0.17)	0.0332 (0.17)	0.0321 (0.16)
Net Income Growth	-0.0148 (-0.72)	-0.0149 (-0.71)	-0.0149 (-0.73)	-0.0149 (-0.73)	-0.0148 (-0.70)
Turnover	0.149** (2.23)	0.149** (2.22)	0.149** (2.23)	0.149** (2.23)	0.149** (2.23)
Investment	1.383* (1.89)	1.490* (1.78)	1.484* (1.82)	1.486* (1.85)	1.328 (1.46)
Four-Factor Loadings	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES
Observations	25,443	25,443	25,443	25,443	25,443
Adj. R-squared	0.014	0.018	0.013	0.011	0.010

This table reports the results of DiD Panel Regression for stocks daily excess returns follows Equation 2. The main independent variable $IMP_MGMT_Top_i$ is a dummy equals one for firms with the Impact Management score located in the top quartile of distribution and zero otherwise. The contrast coded time dummy $Event_Nd_t$ equals one for observations from N-day periods on and after January 23, 2020, and it equals negative one for N-day periods before the event and equals zero for the rest of the observations. The $IMP_MGMT_Top_Event_Nd$ is the interaction term between the $IMP_MGMT_Top_i$ and $Event_Nd_t$. Firm-level control variables and the Four-Factor loadings are included in regressions. From Column (1) to Column (5), the $Event_Nd_t$ takes 1-day, 3-day, 5-day, 10-day and 15-day, respectively. The regression is estimated over the two-year period 2019-2020. The definition and construction method of variables are shown in Table 1. All regressions control for the GICS Sub-industry level fixed effects. Standard errors are clustered by firm and week. The numbers in parentheses are t-statistics. ***, ** and * denote statistical significance at 1%, 5% and 10% level respectively.

Figure 1 Interaction Coefficient of DiD Regression of Daily Excess Returns:
Top Financing Environmental Impact



This figure plots the estimated coefficients of interaction terms $IMP_MGMT_Top_Event_Nd$ in the DiD Panel Regression of daily excess returns follows Equation 2, where N takes from 1 to 10. Regressions includes $IMP_MGMT_Top_i$ dummy, the contrast coded time dummy $Event_Nd_t$, the interaction term $IMP_MGMT_Top_Event_Nd$, firm-level controls and Four-Factor loadings. The regression is estimated over the two-year period 2019-2020. All regressions control for the GICS Sub-industry level fixed effects. Standard errors are clustered by firm and week. ***, ** and * denote statistical significance at 1%, 5% and 10% level, respectively.

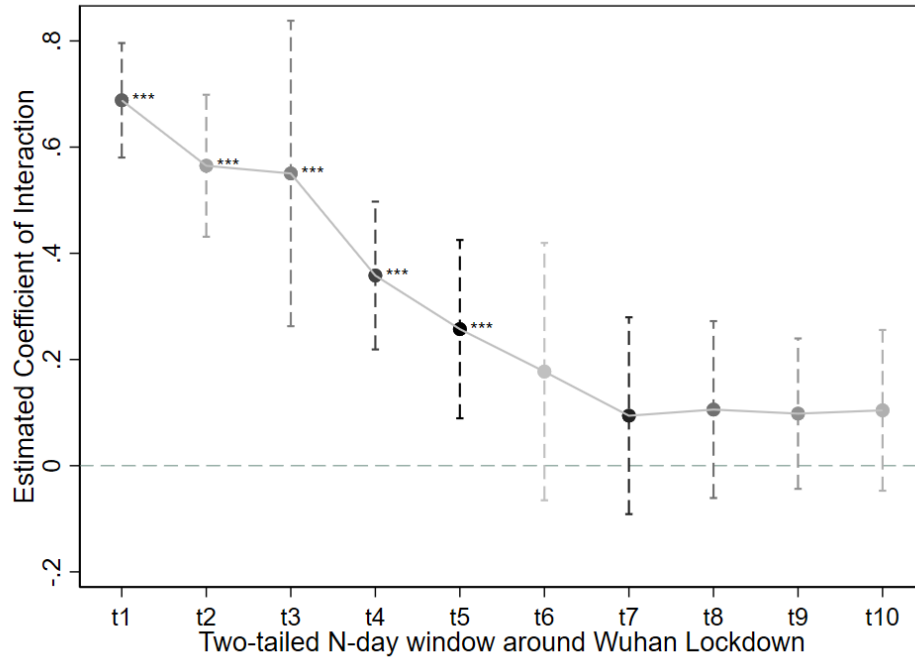
Table 5 DiD Regressions of Daily Returns: Top and Bottom Environmental Financing Impact Comparison

	(1) Excess Return	(2) Excess Return	(3) Excess Return	(4) Excess Return	(5) Excess Return
IMP_MGMT_Top_Bottom	0.0406 (1.45)	0.0405 (1.41)	0.0406 (1.43)	0.0405 (1.42)	0.0405 (1.39)
Event_1d	-2.171*** (-43.01)				
IMP_MGMT_Top_Bottom_Event_1d	0.688*** (12.81)				
Event_3d		-1.697** (-2.39)			
IMP_MGMT_Top_Bottom_Event_3d		0.550*** (3.84)			
Event_5d			-0.802*** (-4.11)		
IMP_MGMT_Top_Bottom_Event_5d			0.257*** (3.07)		
Event_10d				-0.367 (-1.62)	
IMP_MGMT_Top_Bottom_Event_10d				0.104 (1.38)	
Event_15d					0.0921 (0.32)
IMP_MGMT_Top_Bottom_Event_15d					-0.121 (-0.88)
Ln (Asset)	-0.00589 (-0.35)	-0.00519 (-0.31)	-0.00521 (-0.31)	-0.00522 (-0.32)	-0.00628 (-0.36)
Market-to-Book	-0.134* (-1.80)	-0.137* (-1.79)	-0.137* (-1.81)	-0.137* (-1.83)	-0.132* (-1.77)
ROA	-0.0205 (-0.44)	-0.0215 (-0.44)	-0.0214 (-0.45)	-0.0215 (-0.45)	-0.0201 (-0.42)
Cash Ratio	0.263 (1.48)	0.277 (1.54)	0.277 (1.53)	0.276 (1.54)	0.255 (1.39)
Leverage	0.0729 (0.35)	0.0745 (0.35)	0.0750 (0.36)	0.0744 (0.36)	0.0715 (0.34)
Net Income Growth	-0.0172 (-0.83)	-0.0173 (-0.82)	-0.0173 (-0.85)	-0.0173 (-0.84)	-0.0171 (-0.81)
Turnover	0.150** (2.22)	0.150** (2.22)	0.150** (2.23)	0.150** (2.22)	0.149** (2.22)
Investment	1.213 (1.47)	1.309 (1.44)	1.304 (1.44)	1.305 (1.47)	1.161 (1.25)
Four-Factor Loadings	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES
Observations	25,443	25,443	25,443	25,443	25,443
Adj. R-squared	0.014	0.018	0.013	0.011	0.010

This table reports the results of DiD Panel Regression for stocks daily excess returns follows Equation 3. The main independent variable $IMP_MGMT_Top_Bottom_i$ is a dummy equals one for firms with ratings locate in the top quartile of the score distribution, negative one for firms have ratings in the bottom quartile and zero for the rest quartiles. The contrast coded time dummy $Event_Nd_t$ equals one for observations from N-day periods on and after January 23, 2020, and it equals negative one for N-day periods before the event and equals zero for the rest of the observations. The $IMP_MGMT_Top_Bottom_Event_Nd$ is the interaction term between the $IMP_MGMT_Top_Bottom_i$ and $Event_Nd_t$. Firm-level control variables and the Four-Factor loadings are included in regressions. From Column (1) to Column (5), the $Event_Nd_t$ takes 1-day, 3-day, 5-day, 10-day and 15-day, respectively. The regression is estimated over the two-year period 2019-2020. All regressions control for the GICS Subindustry level fixed effects. Standard errors are clustered by firm

and week. The numbers in parentheses are t-statistics. ***, ** and * denote statistical significance at 1%, 5% and 10% level, respectively.

*Figure 2 Interaction Coefficient of DiD Regression of Daily Excess Returns:
Top and Bottom Financing Environmental Impact Comparison*



This figure plots the estimated coefficients of interaction terms $IMP_MGMT_Top_Bottom_Event_Nd$ in the DiD Panel Regression of daily excess returns follows Equation 3, where N takes from 1 to 10. Regressions include $IMP_MGMT_Top_Bottom_i$ dummy, the contrast coded time dummy $Event_Nd_t$, the interaction term $IMP_MGMT_Top_Bottom_Event_Nd$, firm-level controls and Four-Factor loadings. The regression is estimated over the two-year period 2019-2020. All regressions control for the GICS Sub-industry level fixed effects. Standard errors are clustered by firm and week. ***, ** and * denote statistical significance at 1%, 5% and 10% level, respectively.

Table 6 One-year Subperiod - Returns and Top Environmental Financing Impact: Robustness

	(1) Excess Return	(2) Excess Return	(3) Excess Return	(4) Excess Return	(5) Excess Return
IMP_MGMT_Top	-0.0590 (-1.11)	-0.0623 (-1.17)	-0.0621 (-1.10)	-0.0622 (-1.14)	-0.0575 (-1.05)
Event_1d	-2.556*** (-41.98)				
IMP_MGMT_Top_Event_1d	1.432*** (18.71)				
Event_3d		-1.978*** (-2.68)			
IMP_MGMT_Top_Event_3d		1.019*** (6.23)			
Event_5d			-0.941*** (-5.02)		
IMP_MGMT_Top_Event_5d			0.489** (2.55)		
Event_10d				-0.433* (-1.73)	
IMP_MGMT_Top_Event_10d				0.215 (1.32)	
Event_15d					0.132 (0.35)
IMP_MGMT_Top_Event_15d					-0.175 (-0.71)
Ln (Asset)	0.0432* (1.80)	0.0461* (1.83)	0.0461* (1.85)	0.0460* (1.84)	0.0417 (1.59)
Market-to-Book	-0.124 (-1.20)	-0.133 (-1.25)	-0.133 (-1.27)	-0.133 (-1.26)	-0.119 (-1.15)
ROA	-0.0933** (-2.14)	-0.0980* (-1.97)	-0.0981** (-2.14)	-0.0979** (-2.15)	-0.0908* (-1.95)
Cash Ratio	0.844*** (6.28)	0.902*** (5.02)	0.901*** (5.35)	0.901*** (5.04)	0.814*** (4.10)
Leverage	0.299 (1.65)	0.307* (1.68)	0.309* (1.69)	0.306* (1.68)	0.293 (1.57)
Net Income Growth	-0.0147 (-1.23)	-0.0151 (-1.36)	-0.0152 (-1.29)	-0.0151 (-1.27)	-0.0145 (-1.22)
Turnover	0.151 (1.38)	0.150 (1.38)	0.151 (1.39)	0.150 (1.38)	0.150 (1.37)
Investment	6.518*** (2.76)	6.962** (2.45)	6.964*** (2.69)	6.952*** (2.69)	6.292** (2.30)
Four-Factor Loadings	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES
Observations	12,999	12,999	12,999	12,999	12,999
Adj. R-squared	0.018	0.025	0.016	0.012	0.010

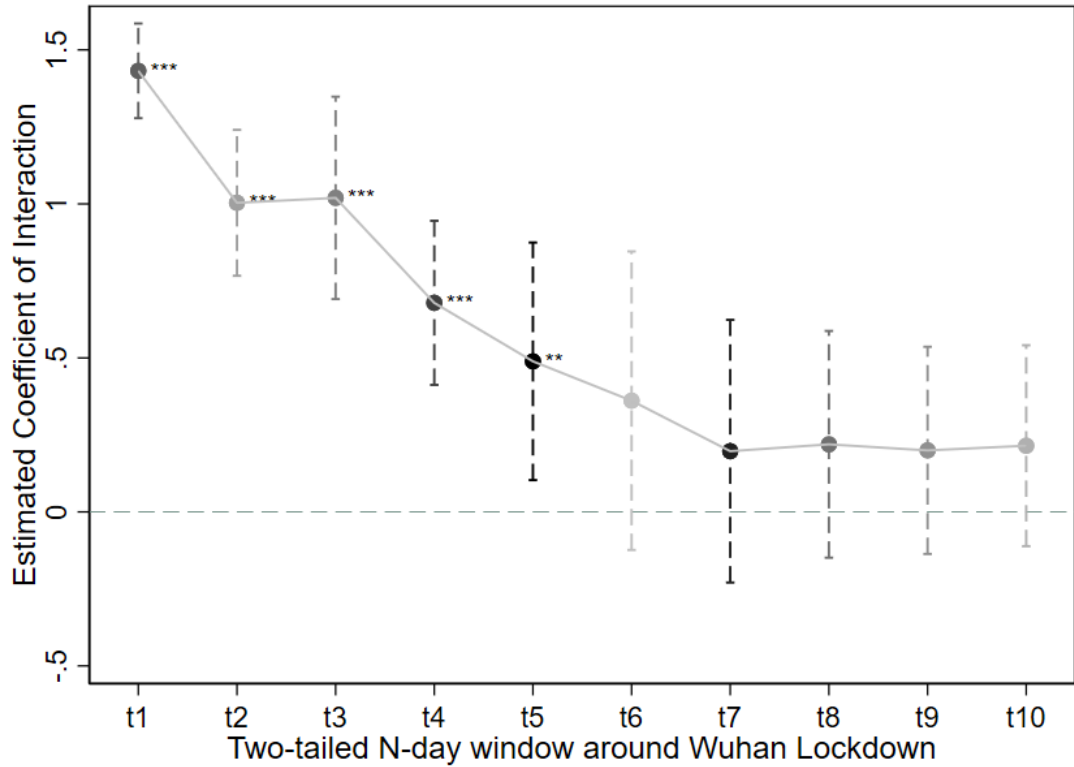
This table reports the results of the robustness test which estimates the model in Equation 2 over the one-year period January 2020 to December 2020. The main independent variable $IMP_MGMT_Top_i$ is a dummy equals one for firms with the Impact Management score located in the top quartile of distribution and zero otherwise. The contrast coded time dummy $Event_Nd_t$ equals one for observations from N-day periods on and after January 23, 2020, and it equals negative one for N-day periods before the event and equals zero for the rest of the observations. The $IMP_MGMT_Top_Event_Nd$ is the interaction term between the $IMP_MGMT_Top_i$ and $Event_Nd_t$. Firm-level control variables and the Four-Factor loadings are included in regressions. From Column (1) to Column (5), the $Event_Nd_t$ takes 1-day, 3-day, 5-day, 10-day and 15-day, respectively. All regressions control for the GICS Sub-industry level fixed effects. Standard errors are clustered by firm

and week. The numbers in parentheses are t-statistics. ***, ** and * denote statistical significance at 1%, 5% and 10% level, respectively.

Figure 3 One-year Subperiod

Interaction Coefficient of DiD Regression of Daily Excess Returns:

Top Financing Environmental Impact



Using the *one-year subperiod from January 2020 to December 2020*, this figure plots the estimated coefficients of interaction terms $IMP_MGMT_Top_Event_Nd$ in the DiD Panel Regression follows Equation 2, where N takes from 1 to 10. Regressions includes $IMP_MGMT_Top_i$ dummy, the contrast coded time dummy $Event_Nd_t$, the interaction term $IMP_MGMT_Top_Event_Nd$, firm-level controls and Four-Factor loadings. All regressions control for the GICS Sub-industry level fixed effects. Standard errors are clustered by firm and week. ***, ** and * denote statistical significance at 1%, 5% and 10% level, respectively.

Table 7 One-year Subperiod – Returns and Top and Bottom Environmental Financing Impact Comparison: Robustness

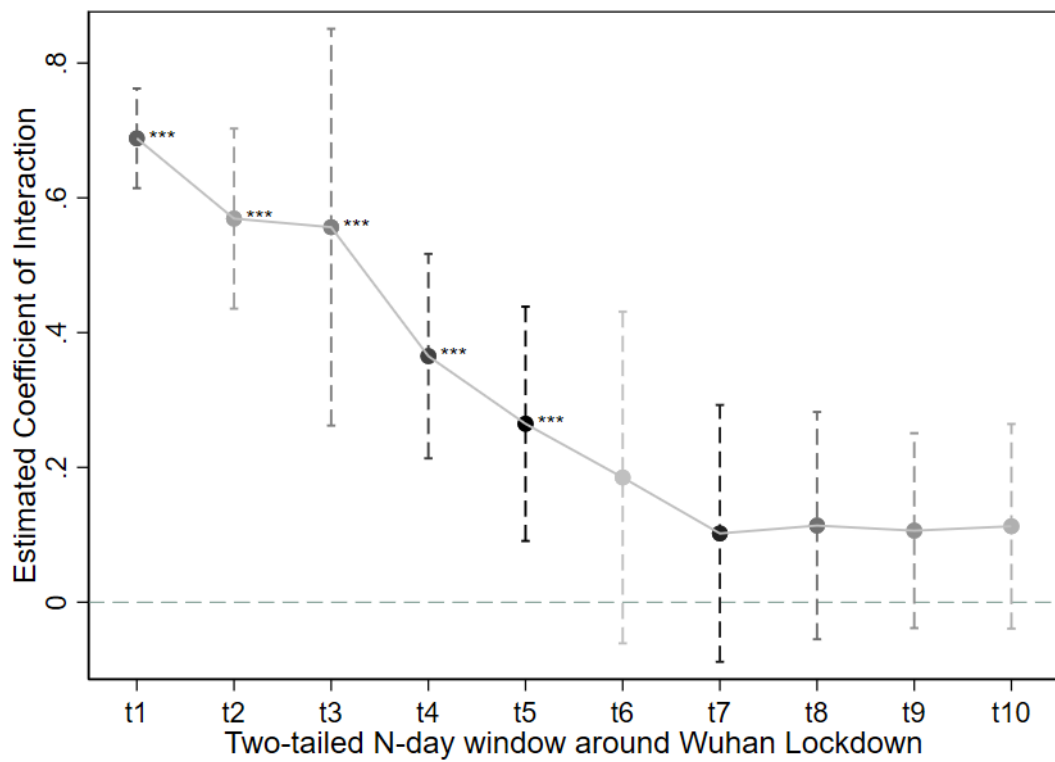
	(1) Excess Return	(2) Excess Return	(3) Excess Return	(4) Excess Return	(5) Excess Return
IMP_MGMT_Top_Bottom	0.0580 (1.25)	0.0599 (1.24)	0.0601 (1.27)	0.0598 (1.27)	0.0567 (1.21)
Event_1d	-2.171*** (-45.99)				
IMP_MGMT_Top_Bottom_Event_1d	0.688*** (18.69)				
Event_3d		-1.704** (-2.46)			
IMP_MGMT_Top_Bottom_Event_3d		0.556*** (3.79)			
Event_5d			-0.810*** (-4.38)		
IMP_MGMT_Top_Bottom_Event_5d			0.265*** (3.06)		
Event_10d				-0.375 (-1.63)	
IMP_MGMT_Top_Bottom_Event_10d				0.113 (1.49)	
Event_15d					0.0845 (0.26)
IMP_MGMT_Top_Bottom_Event_15d					-0.114 (-0.78)
Ln (Asset)	0.0207 (1.55)	0.0226 (1.60)	0.0226 (1.60)	0.0225 (1.59)	0.0197 (1.31)
Market-to-Book	-0.134 (-1.30)	-0.143 (-1.33)	-0.143 (-1.35)	-0.143 (-1.34)	-0.129 (-1.21)
ROA	-0.0817* (-1.80)	-0.0858* (-1.70)	-0.0860* (-1.81)	-0.0857* (-1.82)	-0.0794 (-1.66)
Cash Ratio	1.001*** (4.97)	1.063*** (4.34)	1.064*** (4.62)	1.062*** (4.49)	0.967*** (3.73)
Leverage	0.434* (1.87)	0.447* (1.93)	0.449* (1.92)	0.446* (1.92)	0.424* (1.76)
Net Income Growth	-0.0188 (-1.61)	-0.0193* (-1.75)	-0.0194* (-1.69)	-0.0193* (-1.68)	-0.0184 (-1.56)
Turnover	0.152 (1.36)	0.152 (1.37)	0.153 (1.38)	0.152 (1.37)	0.152 (1.36)

Investment	6.277** (2.57)	6.699** (2.32)	6.704** (2.51)	6.688** (2.52)	6.045** (2.16)
Four-Factor Loadings	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES
Observations	12,999	12,999	12,999	12,999	12,999
Adj. R-squared	0.018	0.025	0.016	0.013	0.011

This table reports the results of DiD Panel Regression for stocks daily excess returns follows Equation 3. *As a robustness check, regressions are estimated over the one-year period January 2020 to December 2020.* The main independent variable $IMP_MGMT_Top_Bottom_i$ is a dummy equals one for firms with ratings locate in the top quartile of the score distribution, negative one for firms have ratings in the bottom quartile and zero for the rest quartiles. The contrast coded time dummy $Event_Nd_t$ equals one for observations from N-day periods on and after January 23, 2020, and it equals negative one for N-day periods before the event and equals zero for the rest of the observations. The $IMP_MGMT_Top_Bottom_Event_Nd$ is the interaction term between the $IMP_MGMT_Top_Bottom_i$ and $Event_Nd_t$. Firm-level control variables and the Four-Factor loadings are included in regressions. From Column (1) to Column (5), the $Event_Nd_t$ takes 1-day, 3-day, 5-day, 10-day and 15-day, respectively. All regressions control for the GICS Sub-industry level

fixed effects. Standard errors are clustered by firm and week. The numbers in parentheses are t-statistics. ***, ** and * denote statistical significance at 1%, 5% and 10% level, respectively.

Figure 4 One-year Subperiod
Interaction Coefficient of DiD Regression of Daily Excess Returns:
Top and Bottom Financing Environmental Impact Comparison



Using the *one-year subperiod from January 2020 to December 2020*, this figure plots the estimated coefficients of interaction terms $IMP_MGMT_Top_Bottom_Event_Nd$ in the DiD Panel Regression of daily excess returns follows Equation 3, where N takes from 1 to 10. Regressions include $IMP_MGMT_Top_Bottom_i$ dummy, the contrast coded time dummy $Event_Nd_t$, the interaction term $IMP_MGMT_Top_Bottom_Event_Nd$, firm-level controls and Four-Factor loadings. The regression is estimated over the two-year period 2019-2020. All regressions control for the GICS Sub-industry level fixed effects. Standard errors are clustered by firm and week. ***, ** and * denote statistical significance at 1%, 5% and 10% level, respectively.